CHAPTER I
INTRODUCTION

1.1 Background

Students were raised in different ways in this called “digital natives” era. Since childhood, students have been immersed in the term technology which has significantly affected the way they gain information, develop knowledge, and acquire skills. According to Jusoh and Ahmad (2016), the educators should be aware of the characteristics of their students and be ready to embrace the technology in the process of teaching for students in digital native’s era.

Indonesia has less science content compared to other countries. Students in Indonesia have little understanding of science-global issues, and less content knowledge, procedural knowledge, and epistemic knowledge (Suprapto, 2016). One of the subjects that considered hard to learn is biology (Çimer, 2012). Based on the research found regarding students perception, there are different reasons adduced by the students in higher secondary for their perception on biology difficult topics. The highest commonly advanced sources was abstractness of topics indicated by 321 (80.25%) students, while the least commonly source was lack of practical classes indicated by 97 (24.25%) students. Other sources included complexity, misconception of topics, unavailable instructional materials, poor attitude of teachers to teaching, lack of practical classes and poor students study habits (Etobro & Fabinu, 2017). Teacher should teach use visual materials and media to make learning interesting since still in junior high school to use such as image, poster, and computer in the class that have been discovered to be effective in biology teaching to makes learning biology more exciting and appealing (Jackson & Songer, 2000; Peat & Fernandez, 2000).

Concept mastery is one of the important learning outcomes include in learning science. Students’ concept mastery can represent the achievement of cognitive skills in science learning process. According to PISA, between 2012 and 2015 alone, science performance among middle school 15-year old students rose by 21 score points. This makes Indonesia becomes the fifth-fastest improving education system among the 72 that took part in this comparison” (Pratiwi, 2019). But, unfortunately the achievement index not significantly increases. Indonesia

still on low level of achievement with rank 62 among 69 countries participated in science. Students' concept mastery can be represents as students' cognitive skill, and it is one of the important aspects for learning outcome. Based on Bloom Taxonomy there are six cognitive levels. There is insufficient evidence to determine whether the use of mind mapping is beneficial to particular types of targeted cognitive abilities skills in individuals (Chang & Liu, 2016).

Overcoming the challenges faced in the twenty-first century on the industry of science and technology, students need to have the skills that can guarantee their competitiveness in the globalization age, and the skills needed are called 21st century skills. Therefore, incorporating abilities in science education in the 21st century is essential. The research about 21st century skills clearly stated that one of the 21st century skills is creativity. Creativity is the term that means many things each of us and represents our unique perspectives and experiences, and it is one of difficult aspect to define creativity (Lucas, 2016). Although there is no evidence of a curriculum and a school system designed to support creative development. The low ability of students in solving problems to master the science concept is in line with the low creativity possessed by these students. On the other hand, teachers feel that students' creativity is not adequate assessed with the usual high stakes testing and so they hesitate to foster the students' creativity (Husin, 2016). The problem is what kind of media use to foster students' creativity in digital era of learning as well as students' concept mastery.

Mind mapping is a teaching and learning strategy that combines semantic understanding and creativity, and it involves thinking in terms of graphic representations (Liu & Chen, 2017). Learners can create personal concept maps based on key content to reflect on their learning process and quickly recall the material using keywords. The use of symbols incorporates radial thinking, memorization techniques, and psychological information processing theory to help learners internalize knowledge and improve learning outcomes (Zubaidah, Fuad, Mahanal, & Suarsini, 2018). Mind map was originally invented by Tony Buzan, a mathematician, psychologist and brain researcher, in the 1970s (Liu & Chen, 2017) as a special technique for taking notes as briefly as possible whilst being as interesting to the eye as possible. The reason is because mind mapping

can be used as an effective way of getting information in and out of our brain; it is a creative and logical means of note-taking and note-making that literally "maps out" our ideas (Wilson, Solas, & Dixon, 2016). Technically speaking, the only tools needed to construct a mind map are pencils (preferably colored) and paper. However, today's digital natives prefer interactive media. Therefore, a number of interactive mind-mapping tools emerged to fulfill the digital natives' preferences including iMindMap, Mind Manager, Mind Meister, Mind Node and Free Mind. Furthermore, with the available current technology, it is possible to create attractive mind maps by using computer, which makes it easy to review, revise and save (Tungprapa, 2015).

Digital interactive mind map can be applied in any topic and suitable for science learning. According to Utami and Subali (2020) on the recent research it is found that it is effective to use mind mapping in excretory system topic. In this research, the researcher will focus on excretory system topic. Excretory system is one of difficult topic in biology with the difficulty above 25% based on the research, the concept that abstract needs the visualization in order to be more understood by students (Etobro & Fabinu, 2017). Rather than most of previous research that aiming for critical thinking skills and implemented it in higher education, this research will investigate the use of digital mind map on concept mastery and creativity of students in junior high school in learning excretory system.

Based on the facts that stated above, the researcher encouraged to do the research with title "The Use of Digital Interactive Science Mind Map to Enhance Students' Concept Mastery and Creativity in Learning Excretory System".

1.2 Research Problem

The research problem of this study is "How is the use of digital interactive mind map to enhance students' concept mastery and creativity in learning excretory system"?

1.3 Research Question

Elaborating the research problem, the research attempts to explore the following question:

1) How is the use of digital interactive mind map to enhance students' concept mastery in learning excretory system?
2) How is the effect of using digital interactive mind map toward students' creativity in learning excretory system?
3) How is the students' impression after learning the concept of excretory system by using digital interactive mind map?

1.4 Limitation of Problem

This research is focusing on some aspect which limited as follows:

1) Mind map is the simplest sense, is a visual tool that is used to organize information. First popularized by the psychology author Tony Buzan, it was developed over 30 years ago as a note-taking and summarization method that maximized on the different functionalities of the two halves of the brain. (Wilson, Solas & Dixon, 2016)
2) Digital interactive mind map is software or application to construct mind map with computer-based oriented which more credible rather than conventional version of paper mind maps evolves and becomes the electronic version of electronic mind maps of today. (Zubaidah, 2018)
3) Students' creativity that measured in this research using Creative Mind map Rubric (CMR) combining Creativity indicators and essential part of mind map consisting Fluency, Flexibility, Originality, and Elaboration with three levels of each indicator. (Susianna, 2016a)
4) Students' concept mastery that measured in this research involves cognitive level stated by Krathwool (2001), which are remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and Creating (C6) based on Bloom Taxonomy.

5) The concept of this research is Excretory System that limited by core competence no. 3 and basic competence no. 3.10 that are attached in Curriculum 2013.

1.5 Research Objective

According to the problem that formulated in the research question, this research objective is specified as follow:

1) To profile students' learning process in learning excretory system by using digital interactive mind map
2) To investigate the use of Digital Interactive Mind Map to enhance students' concept mastery in learning excretory system
3) To investigate the use of Digital Interactive Mind Map toward Students' creativity in learning excretory system
4) To identify students' impression after learning the concept of excretory system by using digital interactive mind map

1.6 Research Benefit

The results of this research are expected to provide the following benefits:

1) Students

   For students, this research encourages creativity by creating mind map using digital interactive mind map software and improves memory retention. The maps are also easier to understand and mastery the concept because learn by focusing on the key topics.

2) Teacher

   For teacher, this research can be used as a teaching resource and as an aid to preparing and reviewing teaching and learning and enhancing students' concept mastery and creativity and understanding using digital interactive mind map.

3) Another Researcher

   For another researcher, this research can be used as a comparative study and for further research

1.7 Organizational Structure of Research Paper

This organizational structure of this research paper contains five chapters and several appendixes. Each chapter consists of sub-chapters. The systematic of this research paper is as follows:

1) Chapter I: Introduction

   This chapter contains the background of the research, research problem, and research question, limitation of problem, research objective, research benefit and organizational structure of the research.

2) Chapter II: Literature Review

   This chapter contains the literature review that describe about the mind map, digital interactive mind map, students' concept mastery, students' creativity, and excretory system.

3) Chapter III: Research Methodology

   This chapter contains the method that used in this research, which are research method, research design, population and sample, operational definition, assumption, hypothesis, research instrument, research procedure, instrument analysis result, and data processing technique.

4) Chapter IV: Result and Discussion

   This chapter contains the result and the discussion of the research that analyzed and interpreted based on research question. The data of this research is presented in the form of tables and figures.

5) Chapter V: Conclusion and Recommendation

   This chapter contains the conclusion of this research as well as the recommendation for future research.